

American National Standard

for information systems –
file structure and labeling
of magnetic tapes
for information interchange



american national standards institute, inc.
1430 broadway, new york, new york 10018

American National Standard
for Information Systems –

File Structure and Labeling
of Magnetic Tapes
for Information Interchange

Secretariat

Computer and Business Equipment Manufacturers Association

Approved March 16, 1987

American National Standards Institute, Inc

Abstract

This standard specifies the volume and file structure for recording on magnetic tape and the requirements necessary to process those volumes and files. Four nested levels of the requirements on the media content are specified.

The standard is primarily directed toward information interchange between implementations of potentially different architecture, but consideration is afforded to local tape processing needs. Such parochial requirements are recognized and considered, with the intent that the standard serve as a guide for designers of implementations that also support a local environment that is different from the interchange environment.

American National Standard

Approval of an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer.

Consensus is established when, in the judgement of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of approval. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

Published by

**American National Standards Institute
1430 Broadway, New York, New York 10018**

Copyright ©1987 by American National Standards Institute, Inc.
All Rights Reserved.

No part of this publication may be reproduced in any form,
in an electronic retrieval system or otherwise, without
the prior written permission of the publisher.

Printed in the United States of America

A1½M987/13

Foreword (This Foreword is not part of American National Standard X3.27-1987.)

The aim of this standard is to reduce the difficulty of interchanging information recorded on magnetic tapes. This aim is accomplished by specifying the format, content, and arrangement of magnetically recorded labels to identify and describe the structure of files, and by specifying the format and arrangement of the blocks containing the records that constitute a file.

This standard contains specifications for four levels of labeling. These levels are upward compatible so that an implementation conforming to a given level may read a volume set conforming to that or any lower levels.

This standard is a revision of American National Standard Magnetic Tape Labels and File Structure for Information Interchange, ANSI X3.27-1978. The principal purpose of the revision is to have an American National Standard that is technically identical with Information processing — File structure and labelling of magnetic tapes for information interchange, ISO 1001-1986. That revision of ISO 1001-1979 was accomplished by ISO based on the work of the ECMA TC15 Committee on Labelling and File Structure.

This edition of the standard differs technically from ANSI X3.27-1978. The main differences are described in Appendix B.

Suggestions for improvement of this standard are welcome. They should be sent to the Computer and Business Equipment Manufacturers Association, 311 First Street, NW, Washington, DC 20001.

This standard was processed and approved for submittal to ANSI by American National Standards Committee on Information Processing Systems, X3. Committee approval of the standard does not necessarily imply that all members voted for its approval. At the time it approved this standard, the X3 Committee had the following members:

Edward Lohse, Chair
Richard Gibson, Vice-Chair
Catherine A. Kachurik, Administrative Secretary

<i>Organization Represented</i>	<i>Name of Representative</i>
American Express	D. L. Seigal
American Library Association	Lucille Durfee (Alt)
American Nuclear Society	Paul Peters
AMP Incorporated	Geraldine C. Main
Association for Computing Machinery	D. R. Vondy (Alt)
Association of the Institute for Certification of Computer Professionals	Edward Kelly
AT&T Communications	Patrick E. Lannan (Alt)
AT&T Technologies	Kenneth Magel
Burroughs Corporation	Jon A. Meads (Alt)
Control Data Corporation	Thomas M. Kurihara
Cooperating Users of Burroughs Equipment	Henry L. Marchese
Data General Corporation	Richard Gibson (Alt)
Data Processing Management Association	Herbert V. Bertine
Digital Equipment Computer Users Society	Paul D. Bartoli (Alt)
Digital Equipment Corporation	Stuart M. Garland (Alt)
	Stanley Fenner
	Charles E. Cooper
	Keith Lucke (Alt)
	Thomas Easterday
	Donald Miller (Alt)
	Michael W. Kelley
	Lyman Chapin (Alt)
	Ward Arrington
	Wallace R. McPherson (Alt)
	William Hancock
	Dennis Perry (Alt)
	Gary S. Robinson
	Delbert L. Shoemaker (Alt)

<i>Organization Represented .</i>	<i>Name of Representative</i>
Eastman Kodak	Gary Haines
General Electric Company	Charleton C. Bard (Alt)
GUIDE International	Richard N. Signor
Harris Corporation	William R. Kruesi (Alt)
Hewlett-Packard	Frank Kirshenbaum
Honeywell Information Systems	Sandra Swartz Abraham (Alt)
IBM Corporation	Walter G. Fredrickson
IEEE Computer Society	Rajiv Sinha (Alt)
Lawrence Berkeley Laboratory	Donald C. Loughry
Moore Business Forms	Thomas J. McNamara
National Bureau of Standards	David M. Taylor (Alt)
National Communications System	Mary Anne Gray
NCR Corporation	Robert H. Follett (Alt)
Prime Computer, Inc.	Sava I. Sherr
Railinc Corporation	Thomas M. Kurihara (Alt)
Recognition Technology Users Association	Thomas A. Varettoni (Alt)
Scientific Computer Systems Corporation	David F. Stevens
SHARE, Inc	Robert L. Fink (Alt)
Sperry Corporation	Delmer H. Oddy
Texas Instruments, Inc	Robert E. Rountree
3M Company	James H. Burrows (Alt)
Travelers Insurance Companies, Inc	George W. White
U.S. Department of Defense	A. Raymond Daniels
U.S. General Services Administration	Thomas W. Kern (Alt)
VIM	Arthur Norton
VISA U.S.A.	Linda J. Allen (Alt)
Wang Laboratories, Inc	R. A. Petrash
Xerox Corporation	Herbert F. Schantz
	G. W. Wetzel (Alt)
	James A. Baker
	Carl Haberland (Alt)
	Thomas B. Steel
	Robert A. Rannie (Alt)
	Marvin W. Bass
	Jean G. Smith (Alt)
	Presley Smith
	Richard F. Trow, Jr (Alt)
	Paul D. Jahnke
	J. Wade Van Valkenburg (Alt)
	Joseph T. Brophy
	Fred Virtue
	Belkis Leong-Hong (Alt)
	William C. Rinehuls
	Larry L. Jackson (Alt)
	Chris Tanner
	Madeleine Sparks (Alt)
	Jean T. McKenna
	Susan Crawford (Alt)
	Marsha Hayek
	Joseph St. Armand (Alt)
	John L. Wheeler
	Roy Pierce (Alt)

Technical Committee X3L5 on Labels and File Structures, which adapted ISO 1001-1986 for this standard, had the following members:

Robert L. Brandt
Alfred A. Brooks
Howard Kaikow
Herbert G. Madsen
James V. Upperman
Theodore C. Woo

Contents	SECTION	PAGE
	1. Scope and Field of Application	7
	2. Conformance	7
	2.1 Conformance of a Magnetic Tape Volume Set	7
	2.2 Conformance of an Information Processing System	7
	3. Referenced and Related Standards	7
	3.1 Referenced Standards	7
	3.2 Related Standards	8
	4. Definitions	8
	5. Notation	9
	6. Arrangement of Labels and Files	9
	6.1 Arrangement of Data on a Volume	9
	6.2 Arrangement of Label Groups	9
	6.3 Arrangement of File Sections	10
	6.4 Relationship of File Sections to a Volume	10
	6.5 Arrangement of Files and File Sets	11
	6.6 Structure of a Volume Set	11
	7. File Structure for Data Interchange	11
	7.1 Blocks	11
	7.2 Records	12
	7.3 Files	13
	8. Format and Contents of the Labels and Label Sets	13
	8.1 Character Set and Coding	13
	8.2 Justification of Characters	14
	8.3 Volume Header Label Set (VOL1 to VOL9)	14
	8.4 Installation Volume Label Set (UVL1 to UVL9)	15
	8.5 File Header Label Set (HDR1 to HDR9)	15
	8.6 User File Header Label Set (UHL)	19
	8.7 End of Volume Label Set (EOV1 to EOV9)	19
	8.8 End of File Label Set (EOF1 to EOF9)	20
	8.9 User File Trailer Label Set (UTL)	22
	9. Levels of Interchange	22
	9.1 Level 1	22
	9.2 Level 2	23
	9.3 Level 3	23
	9.4 Level 4	23
	10. Requirement for the Description of Systems	23
	11. Requirements for an Originating System	23
	11.1 General	23
	11.2 Files	23
	11.3 Labels	23
	11.4 Restrictions	24
	12. Requirements for a Receiving System	24
	12.1 General	24
	12.2 Files	25
	12.3 Labels	25
	12.4 Restrictions	25

SECTION	PAGE
Appendixes	
Appendix A Initialized Volumes	26
A1. Purpose.	26
A2. Specification	26
Appendix B Main Differences between ANSI X3.27-1978 and ANSI X3.27-1987	27

American National Standard for Information Systems –

File Structure and Labeling of Magnetic Tapes for Information Interchange

1. Scope and Field of Application

This standard specifies the file structure and the labeling of magnetic tapes for the interchange of information between users of information processing systems.

This standard specifies:

- volume and file structure;
- basic characteristics of the blocks containing the records constituting the file;
- recorded labels for identifying files, file sections, and volumes of magnetic tapes;
- four nested levels of interchange;
- requirements for the processes which are provided within information processing systems, to enable information to be interchanged between different systems, utilizing recorded magnetic tape as the medium of interchange; for this purpose it specifies the functions to be provided within systems which are intended to originate or receive magnetic tape volumes which conform to this standard.

2. Conformance

2.1 Conformance of a Magnetic Tape Volume Set. A magnetic tape volume set conforms to this standard when all information recorded on it conforms to the specifications of this standard. A statement of conformance shall identify the lowest level of interchange to which the contents of the magnetic tapes conform.

A prerequisite to such conformance is conformance of each volume of the volume set to the same standard for recorded magnetic tape (see 4.18).

2.2 Conformance of an Information Processing System. An information processing system conforms to this standard if it meets all the requirements specified in this standard either for an originating system, or for a receiving system, or for both types of system. A statement of conformance shall identify which of these sets of requirements can be met by the system.

3. Referenced and Related Standards

3.1 Referenced Standards

3.1.1 This standard is intended for use in conjunction with American National Standard for Information Systems — Coded Character Sets — 7-Bit American National Standard Code for Information Interchange (7-Bit ASCII), ANSI X3.4-1986. When this standard is superseded by a revision approved by the American National Standards Institute, Inc, the revision shall apply.

3.1.2 This standard is intended for use in conjunction with a standard for recorded magnetic tape (see 4.18). Such extant American National Standards include the following. When any of these standards is superseded by a revision approved by the American National Standards Institute, Inc, the revision shall apply.

ANSI X3.14-1983, Information Systems — Recorded Magnetic Tape for Information Interchange (200 CPI, NRZI)

ANSI X3.22-1983, Information Systems — Recorded Magnetic Tape for Information Interchange (800 CPI, NRZI)

ANSI X3.39-1986, Information Systems — Recorded Magnetic Tape for Information Interchange (1600 CPI, Phase Encoded)

ANSI X3.54-1986, Information Systems — Recorded Magnetic Tape for Information Interchange (6250 CPI, Group Coded Recording)

NOTE: The standard for recorded magnetic tape used in conjunction with this standard is subject to agreement between the originator and the recipient of the volume.

3.2 Related Standards

ANSI X3.40-1983, Information Systems — Unrecorded Magnetic Tape for Information Interchange (9-Track 800 CPI, NRZI; 1600 CPI, PE; and 6250 CPI, GCR)

ANSI X3.41-1974, Code Extension Techniques for Use with the 7-Bit Coded Character Set of American National Standard Code for Information Interchange

4. Definitions

4.1 Application Program. A program that processes the contents of records belonging to a file, and may also process selected attribute data relating to the file or to the volume(s) on which it is recorded.

NOTE: An application program is a specific class of user as defined in this standard.

4.2 Block. A group of bytes recorded consecutively in accordance with the relevant standard for recorded magnetic tape.

NOTE: The minimum and maximum lengths of a block are specified in the relevant standard for recorded magnetic tape.

4.3 Blocked. An attribute of records and record segments that indicates that they may begin at a byte that is not the first byte of a block.

4.4 Byte. A string of eight binary digits operated upon as a unit.

4.5 File. A named collection of information consisting of zero or more records.

4.6 File Section. That part of a file that is recorded on any one volume.

4.7 File Set. A collection of one or more files recorded consecutively on a set of volumes.

4.8 Fixed-Length Record. A record contained in a file in which all records must have the same length.

4.9 Implementation. A set of processes within an information processing system which enable that system to behave as an originating system, or as a receiving system, or as both types of system.

4.10 Installation. A person or other entity which controls the use of one or more implementations which process and interchange magnetic tapes.

NOTE: An installation is a specific class of user as defined in this standard.

4.11 Label. A record that identifies and characterizes a volume, or a file section on a volume.

4.12 Originating System. An information processing system which can record a file set on a volume set for the purpose of data interchange with another system.

4.13 Originator. A person who is responsible for issuing commands to an originating system.

4.14 Receiving System. An information processing system which can read a file set from a volume set which has been recorded by another system for the purpose of data interchange.

4.15 Recipient. A person who is responsible for issuing commands to a receiving system.

4.16 Record. Related data treated as a unit of information.

4.17 Segmented Record. A record contained in a file which is assigned to contain records that may have different lengths and that may be recorded entirely in one block or over more than one block.

4.18 Standard for Recorded Magnetic Tape. A standard that specifies the recording method and the track format of a magnetic tape (for example, see 3.1.2).

4.19 Tape Mark. A control block used as a delimiter.

NOTE: The structure of tape marks is specified by the relevant standards for recorded magnetic tape.

4.20 User. A person or other entity that causes the invocation of the services provided by an implementation.

4.21 Variable-Length Record. A record contained in a file in which the records may have different lengths.

4.22 Volume. A dismountable reel of magnetic tape.

4.23 Volume Set. A collection of one or more volumes, on which a file set is recorded.

5. Notation

The following notation is used in this standard:

BP	Byte position within the label
L	Length of the field in number of byte positions
Digit(s)	Any digit from ZERO to NINE

With the exception of SPACE, a group of capital letters in the content column of a table specifying label contents indicates that these characters shall appear in the order given and in the corresponding byte positions of the field specified, for example, VOL in BP 1 to 3 of the Volume Header Labels. In the tables and throughout this standard, SPACE signifies the character coded in position 2/0 of ANSI X3.4-1986.

6. Arrangement of Labels and Files

6.1 Arrangement of Data on a Volume. A volume shall be recorded with a sequence of blocks and tape marks. The sequence shall commence with a block and shall terminate within the usable recording area.

6.2 Arrangement of Label Groups

6.2.1 Labels. A label shall be a record that shall have a length of 80 bytes. Each label shall be recorded within the first or only 80 byte positions of a block. If the block contains any additional bytes, they shall be recorded with any desired bit combinations.

Each label shall be one of the following types:

- Volume Header
- Installation Volume
- File Header
- User File Header
- End of File
- End of Volume
- User File Trailer

6.2.2 Label Sets. A sequence of one or more labels of the same type, recorded in consecutive blocks, shall be a label set of that type. All labels in a set shall be numbered consecutively starting from 1, except those labels in User File Header and User File Trailer Label Sets.

The labels in User File Header and User File Trailer Label Sets may be identified in any order and may contain duplicate identifiers within a set.

6.2.3 Label Groups. A label group shall consist of a mandatory label set, optionally followed by a second label set of a different type. Each label group shall be one of the types listed in the table below, and shall include only those label sets listed in the corresponding entry of the table. The first set listed in each table entry is the mandatory set, and the second set listed is the optional set.

Label Group	Label Sets
Beginning of Volume	Volume Header Installation Volume
Beginning of File Section	File Header User File Header
End of File Section	End of Volume User File Trailer
End of File	End of File User File Trailer

6.3 Arrangement of File Sections

6.3.1 File Section. A file section shall be recorded in a sequence of one or more blocks, or no blocks. If no blocks are recorded, the file section is regarded as empty.

6.3.2 Labeled-Sequence

6.3.2.1 A Labeled-Sequence shall consist of the sequence of blocks and tape marks as listed below, recorded consecutively:

- Beginning of File Section Label Group
- tape mark
- a file section
- tape mark
- either an End of File Label Group or an End of File Section Label Group, as required in 6.3.2.2
- tape mark

6.3.2.2 If the file section is the last or only file section of a file, then the label group that follows it shall be an End of File Label Group. Otherwise the label group shall be an End of File Section Label Group.

NOTE: An End of File Section Label Group can only be the last label group on a volume because of the requirements of 6.5.1.

6.3.2.3 Within a Labeled-Sequence the information contained in the File Header Label Set, and in the End of File or End of Volume Label Set, shall apply to the file section that is recorded within the sequence.

6.3.2.4 Within a Labeled-Sequence the number of labels in an End of Volume or End of File Label Set shall be equal to the number of labels in the File Header Label Set. Within all Labeled-Sequences in which the file sections of a file are recorded, the number of File Header Labels shall be the same.

6.4 Relationship of File Sections to a Volume. The information on a volume shall consist of the sequence of blocks and tape marks as listed below, recorded consecutively:

- Beginning of Volume Label Group
- one or more Labeled-Sequences
- tape mark

Any recording following the last tape mark of the sequence shall be ignored in interchange.

The information that identifies and describes the volume shall be contained in the Volume Header Label Set, within the Beginning of Volume Label Group.

6.5 Arrangement of Files and File Sets

6.5.1 Files. If a file is recorded entirely within one volume, it shall consist of only one file section.

If a file is recorded over more than one volume, then only one file section of the file shall be recorded on any one volume, and

- the first file section shall be recorded as the last or only file section on a volume
- any intermediate file section shall be recorded as the only file section on a volume
- the last file section shall be recorded as the first or only file section on a volume

All sections of a file shall be numbered consecutively starting from 1.

6.5.2 File Sets. A file set shall consist of one or more files having a common file set identifier. All files in a file set shall be numbered consecutively starting from 1.

The files in a file set shall be recorded consecutively over a set of one or more volumes.

6.6 Structure of a Volume Set. A volume set shall be the set of volumes on which a file set is recorded. The volume set shall contain only one file set.

7. File Structure for Data Interchange

This section specifies the file structure for data interchange in terms of data blocks and data records, and identifies the label fields defined for that purpose.

7.1 Blocks

7.1.1 Characteristics. A block in which part of a file section is recorded shall contain one or more Measured Data Units (MDU). Each MDU either shall be a fixed-length record, or shall contain a variable-length record or a record segment.

A block in which part of a file section is recorded may contain:

- an Offset field preceding the first or only MDU
- a Padding field following the last or only MDU

The first or only MDU in a block shall begin at the first byte of the block after the Offset field (if any). Each subsequent MDU shall begin at the byte immediately following the last byte of the preceding MDU in that block. Each MDU shall end in the block in which it begins.

7.1.2 Block Length. The length of a block shall be the number of bytes in the block. Within a file, all blocks may have different lengths. The length of a block shall be the sum of:

- the lengths of the MDUs in the block
- the length of the Offset field
- the length of the Padding field

A maximum block length shall be assigned for a file. The block length shall not exceed the maximum value specified by the relevant standard for recorded magnetic tape.

7.1.3 Offset Field. This field shall consist of not more than 99 bytes. It shall be reserved for implementation use. Its contents are not specified by this standard and may be ignored in interchange.

7.1.4 Padding Field. This field shall consist of a number of bytes sufficient to extend the length of a block to either

- the minimum length required by the relevant standard for recorded magnetic tape, or
- a greater length as required by the implementation.

Each byte of this field shall contain bit combination (b_8 to b_1) 01011110. This field shall be ignored in interchange.

7.2 Records

7.2.1 Characteristics. A record shall have the following characteristics:

- A record may be either a fixed-length record, or a variable-length record, or a segmented record.
- A fixed-length record or a variable-length record shall be recorded entirely within one block; a segmented record may be recorded in part of one or more blocks.
- The length of a record shall be the number of bytes in the record.

7.2.2 Fixed-Length Records. A fixed-length record shall be a record contained in a file that is assigned to contain records that must all have the same length. The minimum assigned length of a fixed-length record shall be one byte and the maximum assigned length shall not exceed the assigned block length less the length of the Offset field. At least one byte of a fixed-length record shall not contain bit combination (b_8 to b_1) 01011110.

7.2.3 Variable-Length Records. A variable-length record shall be a record contained in a file that is assigned to contain records that may have different lengths.

A variable-length record shall be contained in an MDU. The MDU shall consist of a Record Control Word (RCW), followed immediately by the variable-length record. The RCW shall consist of four characters which shall be coded in accordance with ANSI X3.4-1986 and shall express the sum of the lengths of the record and of the RCW as a four-digit decimal number.

A maximum record length shall be assigned for a file. The length of any record in the file shall not exceed this value. The assigned maximum record length shall not be zero and shall not exceed the assigned block length less the length of the Offset field and less the length of the RCW.

The minimum length of a variable-length record shall be zero.

7.2.4 Segmented Records. A segmented record shall be a record contained in a file that is assigned to contain records that may have different lengths and that may be recorded entirely in one block or over more than one block.

That part of a segmented record that is recorded in one block is a record segment. There shall be only one segment of the same record in a block.

Successive segments of the same record within the same file section shall be recorded in successive blocks.

Different segments of the same record shall be recorded in different file sections only if one of the segments is recorded in the last block of a file section, and the next segment of the record is recorded in the first block of the next nonempty file section of that file.

A maximum record length shall be assigned for a file. The length of any record in the file shall not exceed this assigned value. The assigned maximum record length shall not be zero.

NOTE: The assigned maximum record length is unbounded because this standard specifies no limit to the number of record segments in a record.

A record segment shall be contained in an MDU. The MDU shall consist of a Segment Control Word (SCW), followed immediately by the record segment. The SCW shall consist of five characters which shall be coded in accordance with ANSI X3.4-1986.

The first character of the SCW is called the Segment Indicator. This character shall have one of the values 0, 1, 2, or 3 with the following meaning:

- 0 shall mean that the record begins and ends in this record segment
- 1 shall mean that the record begins but does not end in this record segment
- 2 shall mean that the record neither begins nor ends in this record segment
- 3 shall mean that the record ends but does not begin in this record segment

The last four characters of the SCW shall express as a decimal number the sum of the lengths of the record segment and of the SCW.

The length of a record segment shall not exceed the assigned block length less the length of the Offset field and less the length of the SCW.

The minimum length of a record segment shall be zero.

7.2.5 Coded Representation of Data. The contents of each record shall be interpreted in accordance with the relevant standards for the coded representation of information.

7.3 Files

7.3.1 Characteristics. A file shall contain either only fixed-length records or only variable-length records or only segmented records.

7.3.2 Consistency of File Attributes between File Sections. The following label fields in the File Header Label Set for each file section of the same file shall contain the same characters:

- File Identifier (HDR1 BP 5-21)
- File Set Identifier (HDR1 BP 22-27)
- File Sequence Number (HDR1 BP 32-35)
- Generation Number (HDR1 BP 36-39)
- Generation Version Number (HDR1 BP 40-41)
- File Accessibility (HDR1 BP 54)
- Record Format (HDR2 BP 5)
- Block Length (HDR2 BP 6-10)
- Record Length (HDR2 BP 11-15)
- Offset Length (HDR2 BP 51-52)

7.3.3 File Organization. The file organization shall be sequential.

8. Format and Contents of the Labels and Label Sets

8.1 Character Set and Coding. Unless otherwise stated, the characters in the labels shall be coded in accordance with ANSI X3.4-1986.

The 57 characters used in the labels shall be those in the following positions of the standard code table in ANSI X3.4-1986:

Character	Graphic	Code Position	Character	Graphic	Code Position
SPACE		2/0	PERIOD	.	2/14
EXCLAMATION POINT	!	2/1	SLANT	/	2/15
QUOTATION MARK	"	2/2	Digit ZERO to NINE	0 . . . 9	3/0-3/9
PERCENT SIGN	%	2/5	COLON	:	3/10
AMPERSAND	&	2/6	SEMICOLON	;	3/11
APOSTROPHE	'	2/7	LESS-THAN SIGN	<	3/12
LEFT PARENTHESIS	(	2/8	EQUALS SIGN	=	3/13
RIGHT PARENTHESIS	)	2/9	GREATER-THAN SIGN	>	3/14
ASTERISK	*	2/10	QUESTION MARK	?	3/15
PLUS SIGN	+	2/11	Capital letters A to Z	A . . . Z	4/1-5/10
COMMA	,	2/12	UNDERLINE	—	5/15
HYPHEN	-	2/13			

These 57 characters are referred to as *a-characters*.

8.2 Justification of Characters. In the label fields, characters shall be justified as follows:

- in each field, the content of which is specified by this standard to be digits, the digits shall be right-justified and any remaining positions on the left shall be filled with ZEROs
- in each field, the content of which is specified by this standard to be a-characters, the a-characters shall be left-justified and any remaining positions on the right shall be filled with SPACES

8.3 Volume Header Label Set (VOL1 to VOL9). A Volume Header Label Set shall be a label set comprising at least one and at most nine Volume Header Labels.

8.3.1 First Volume Header Label (VOL1). The First Volume Header Label shall identify the volume, the owner, the accessibility conditions, the implementation recording the Volume Header Label Set, and the version of this standard which applies.

BP	Field Name	L	Content
1-3	Label Identifier	3	VOL
4	Label Number	1	1
5-10	Volume Identifier	6	a-characters
11	Volume Accessibility	1	a-character
12-24	(Reserved for future standardization)	13	SPACES
25-37	Implementation Identifier	13	a-characters
38-51	Owner Identifier	14	a-characters
52-79	(Reserved for future standardization)	28	SPACES
80	Label Standard Version	1	4

8.3.1.1 Fields Reserved for Future Standardization (BP 12-24 and BP 52-79). These fields shall be reserved for future standardization. The characters in these fields shall be SPACES.

8.3.1.2 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be VOL.

8.3.1.3 Label Number (BP 4). This field shall specify the label number. The character in this field shall be the digit ONE.

8.3.1.4 Volume Identifier (BP 5-10). This field shall specify an identification of the volume. The characters in this field shall be a-characters.

8.3.1.5 Volume Accessibility (BP 11). This field shall specify whether there are installation-specified restrictions under which the volume may be accessed. The character in this field shall be an a-character.

SPACE shall mean that no such restrictions for access to the volume have been agreed upon between the originator and the recipient of the volume.

Any other a-character shall mean that there are particular restrictions for access to the volume that are subject to agreement between the originator and the recipient of the volume.

8.3.1.6 Implementation Identifier (BP 25-37). This field shall specify an identification of the implementation which recorded the Volume Header Label Set. The characters in this field shall be a-characters.

8.3.1.7 Owner Identifier (BP 38-51). This field shall specify an identification of the owner of the volume. The characters in this field shall be a-characters.

8.3.1.8 Label Standard Version (BP 80). This field shall specify the version of this standard to which the volume is expected to conform. The character in this field shall be a digit. The digit FOUR shall indicate the present version of this standard.

8.3.2 Other Volume Header Labels (VOL2 to VOL9). Other Volume Header Labels are optional. If present, they shall contain implementation-defined information and shall have the following layout.

BP	Field Name	L	Content
1-3	Label Identifier	3	VOL
4	Label Number	1	Digits 2 to 9
5-80	(Reserved for implementation use)	76	Not specified

8.3.2.1 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be VOL.

8.3.2.2 Label Number (BP 4). This field shall specify the label number. The character in this field shall be one of the digits TWO to NINE.

8.3.2.3 Field Reserved for Implementation Use (BP 5-80). This field shall be reserved for implementation use. This standard neither specifies nor restricts the bit combinations which may be recorded in this field, nor does it specify any meaning for these bit combinations.

8.4 Installation Volume Label Set (UVL1 to UVL9). An Installation Volume Label Set is optional. If present, it shall comprise at least one and at most nine Installation Volume Labels. They shall have the following layout.

BP	Field Name	L	Content
1-3	Label Identifier	3	UVL
4	Label Number	1	Digits 1 to 9
5-80	(Reserved for installation use)	76	Not specified

8.4.1 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be UVL.

8.4.2 Label Number (BP 4). This field shall specify the label number. The character in this field shall be one of the digits ONE to NINE.

8.4.3 Field Reserved for Installation Use (BP 5-80). This field shall be reserved for installation use. This standard neither specifies nor restricts the bit combinations which may be recorded in this field, nor does it specify any meaning for these bit combinations.

8.5 File Header Label Set (HDR1 to HDR9). A File Header Label Set shall be a label set comprising at least two and at most nine File Header Labels.

8.5.1 First File Header Label (HDR1). The First File Header Label shall identify the file section, specify the position of the file section within a file set, and specify certain attributes of the file section.

BP	Field Name	L	Content
1-3	Label Identifier	3	HDR
4	Label Number	1	1
5-21	File Identifier	17	a-characters
22-27	File Set Identifier	6	a-characters
28-31	File Section Number	4	Digits
32-35	File Sequence Number	4	Digits
36-39	Generation Number	4	Digits
40-41	Generation Version Number	2	Digits
42-47	Creation Date	6	SPACE, Digits
48-53	Expiration Date	6	SPACE, Digits
54	File Accessibility	1	a-character
55-60	Block Count	6	ZEROs
61-73	Implementation Identifier	13	a-characters
74-80	(Reserved for future standardization)	7	SPACES

8.5.1.1 Field Reserved for Future Standardization (BP 74-80). This field shall be reserved for future standardization. The characters in this field shall be SPACES.

8.5.1.2 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be HDR.

8.5.1.3 Label Number (BP 4). This field shall specify the label number. The character in this field shall be the digit ONE.

8.5.1.4 File Identifier (BP 5-21). This field shall specify an identification of the file. The characters in this field shall be a-characters.

NOTE: The File Identifier field of a file within a file set is permitted to be the same as that of other files in the file set.

8.5.1.5 File Set Identifier (BP 22-27). This field shall specify an identification of the file set. The characters in this field shall be a-characters.

8.5.1.6 File Section Number (BP 28-31). This field shall specify the ordinal number of the file section as a four-digit decimal number. The characters in this field shall be digits.

8.5.1.7 File Sequence Number (BP 32-35). This field shall specify the ordinal number of the file in a file set as a four-digit decimal number. The characters in this field shall be digits.

8.5.1.8 Generation Number (BP 36-39). This field shall specify an identification of the generation of a file as a four-digit decimal number from 0001 to 9999. The characters in this field shall be digits.

NOTE: The Generation Number field of a file within a file set is permitted to be the same as that of other files with the same File Identifier in the file set.

8.5.1.9 Generation Version Number (BP 40-41). This field shall specify an identification of the version of the generation of a file as a two-digit decimal number. The characters in this field shall be digits.

NOTE: The Generation Version Number field of a file within a file set is permitted to be the same as that of other files with the same File Identifier and Generation Number fields in the file set.

8.5.1.10 Creation Date (BP 42-47). This field shall specify the creation date of a file section. The characters in this field shall be SPACE and digits.

The first character shall specify that the two most significant digits of the year are 19 if it is SPACE and are 20 if it is digit ZERO.

The next two characters shall be digits specifying the two least significant digits of the year from 00 to 99.

The next three characters shall be digits specifying the ordinal number of the day as a three-digit decimal number from 001 to 366.

If the last five characters are ZEROs, this shall indicate that the creation date is not specified.

8.5.1.11 Expiration Date (BP 48-53). This field shall specify the earliest date at which the data of the file section may be regarded as obsolete. The characters in this field shall be SPACE and digits.

The first character shall specify that the two most significant digits of the year are 19 if it is SPACE and are 20 if it is digit ZERO.

The next two characters shall be digits specifying the two least significant digits of the year from 00 to 99.

The next three characters shall be digits specifying the ordinal number of the day as a three-digit decimal number from 001 to 366.

If the last five characters are ZEROs, this shall indicate that the expiration date is not specified and that the data may be regarded as obsolete.

8.5.1.12 File Accessibility (BP 54). This field shall specify whether there are installation-specified restrictions under which the file may be accessed. The character in this field shall be an a-character.

SPACE shall mean that no such restrictions for access to the file have been agreed upon between the originator and the recipient of the volume.

Any other a-character shall mean that there are particular restrictions for access to the file that are subject to agreement between the originator and the recipient of the volume.

8.5.1.13 Block Count (BP 55-60). This field shall specify a constant value. The characters in this field shall be ZEROs.

8.5.1.14 Implementation Identifier (BP 61-73). This field shall specify an identification of the implementation which recorded the label set. The characters in this field shall be a-characters.

8.5.2 Second File Header Label (HDR2). The Second File Header Label shall specify certain attributes of the file and implementation-defined information.

BP	Field Name	L	Content
1-3	Label Identifier	3	HDR
4	Label Number	1	2
5	Record Format	1	F or D or S
6-10	Block Length	5	Digits
11-15	Record Length	5	Digits
16-50	(Reserved for implementation use)	35	Not specified
51-52	Offset Length	2	Digits
53-80	(Reserved for future standardization)	28	SPACES

8.5.2.1 Field Reserved for Future Standardization (BP 53-80). This field shall be reserved for future standardization. The characters in this field shall be SPACES.

8.5.2.2 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be HDR.

8.5.2.3 Label Number (BP 4). This field shall specify the label number. The character in this field shall be the digit TWO.

8.5.2.4 Record Format (BP 5). This field shall specify the format of the records of the file. The character in this field shall be F, D, or S.

F shall mean that all records are fixed-length records

D shall mean that all records are variable-length records

S shall mean that all records are segmented records

8.5.2.5 Block Length (BP 6-10). This field shall specify the maximum permitted length of a data block of the file as a five-digit decimal number. The characters in this field shall be digits.

8.5.2.6 Record Length (BP 11-15). This field shall specify a five-digit decimal number as follows. The characters in this field shall be digits.

If the Record Format field (HDR2 BP 5) contains F, the Record Length field shall specify the length of each data record.

If the Record Format field (HDR2 BP 5) contains D, the Record Length field shall specify the maximum length of an MDU in the file.

If the Record Format field (HDR2 BP 5) contains S, the Record Length field shall specify the maximum length of a record in the file. This number shall not include the bytes in the Segment Control Words. If all characters are ZEROS, this shall mean that the maximum record length may be greater than 99999 bytes.

8.5.2.7 Field Reserved for Implementation Use (BP 16-50). This field shall be reserved for implementation use. This standard neither specifies nor restricts the bit combinations which may be recorded in this field, nor does it specify any meaning for these bit combinations.

8.5.2.8 Offset Length (BP 51-52). This field shall specify the length of the Offset field as a two-digit decimal number. The characters in this field shall be digits.

8.5.3 Other File Header Labels (HDR3 to HDR9). Other File Header Labels are optional. If present, they shall contain implementation-defined information and shall have the following layout.

BP	Field Name	L	Content
1-3	Label Identifier	3	HDR
4	Label Number	1	Digits 3 to 9
5-80	(Reserved for implementation use)	76	Not specified

8.5.3.1 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be HDR.

8.5.3.2 Label Number (BP 4). This field shall specify the label number. The character in this field shall be one of the digits THREE to NINE.

8.5.3.3 Field Reserved for Implementation Use (BP 5-80). This field shall be reserved for implementation use. This standard neither specifies nor restricts the bit combinations which may be recorded in this field, nor does it specify any meaning for these bit combinations.

8.6 User File Header Label Set (UHL). A User File Header Label Set is optional. If present, its labels shall have the following layout.

BP	Field Name	L	Content
1-3	Label Identifier	3	UHL
4	Label Number	1	a-character
5-80	(Reserved for application use)	76	Not specified

8.6.1 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be UHL.

8.6.2 Label Number (BP 4). This field shall be reserved for application use. The character in this field shall be an a-character.

8.6.3 Field Reserved for Application Use (BP 5-80). This field shall be reserved for application use. This standard neither specifies nor restricts the bit combinations which may be recorded in this field, nor does it specify any meaning for these bit combinations.

8.7 End of Volume Label Set (EOV1 to EOVS). An End of Volume Label Set shall be a label set comprising at least two and at most nine End of Volume Labels.

8.7.1 First End of Volume Label (EOV1)

BP	Field Name	L	Content
1-3	Label Identifier	3	EOV
4	Label Number	1	1
5-21	File Identifier	17	a-characters
22-27	File Set Identifier	6	a-characters
28-31	File Section Number	4	Digits
32-35	File Sequence Number	4	Digits
36-39	Generation Number	4	Digits
40-41	Generation Version Number	2	Digits
42-47	Creation Date	6	SPACE, Digits
48-53	Expiration Date	6	SPACE, Digits
54	File Accessibility	1	a-character
55-60	Block Count	6	Digits
61-73	Implementation Identifier	13	a-characters
74-80	(Reserved for future standardization)	7	SPACES

Within a Labeled-Sequence the contents of the fields of this label shall be identical with the contents of the corresponding fields in the First File Header Label, except for the following fields.

8.7.1.1 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be EOVS.

8.7.1.2 Block Count (BP 55-60). This field shall specify, as a six-digit decimal number, the number of blocks in which the file section is recorded. The characters in this field shall be digits.

8.7.1.3 Implementation Identifier (BP 61-73). This field shall specify an identification of the implementation which recorded the label set. The characters in this field shall be a-characters.

8.7.2 Second End of Volume Label (EOV2)

BP	Field Name	L	Content
1-3	Label Identifier	3	EOV
4	Label Number	1	2
5	Record Format	1	F or D or S
6-10	Block Length	5	Digits
11-15	Record Length	5	Digits
16-50	(Reserved for implementation use)	35	Not specified
51-52	Offset Length	2	Digits
53-80	(Reserved for future standardization)	28	SPACES

Within a Labeled-Sequence the contents of the fields of this label shall be identical with the contents of the corresponding fields of the Second File Header Label, except for the following fields.

8.7.2.1 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be EOV.

8.7.2.2 Field Reserved for Implementation Use (BP 16-50). This field shall be reserved for implementation use. This standard neither specifies nor restricts the bit combinations which may be recorded in this field, nor does it specify any meaning for these bit combinations.

8.7.3 Other End of Volume Labels (EOV3 to EOV9). Other End of Volume Labels are optional. If present, they shall contain implementation-defined information and shall have the following layout.

BP	Field Name	L	Content
1-3	Label Identifier	3	EOV
4	Label Number	1	Digits 3 to 9
5-80	(Reserved for implementation use)	76	Not specified

8.7.3.1 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be EOV.

8.7.3.2 Label Number (BP 4). This field shall specify the label number. The character in this field shall be one of the digits THREE to NINE.

8.7.3.3 Field Reserved for Implementation Use (BP 5-80). This field shall be reserved for implementation use. This standard neither specifies nor restricts the bit combinations which may be recorded in this field, nor does it specify any meaning for these bit combinations.

8.8 End of File Label Set (EOF1 to EOF9). An End of File Label Set shall be a label set comprising at least two and at most nine End of File Labels.

8.8.1 First End of File Label (EOF1)

BP	Field Name	L	Content
1-3	Label Identifier	3	EOF
4	Label Number	1	1
5-21	File Identifier	17	a-characters
22-27	File Set Identifier	6	a-characters
28-31	File Section Number	4	Digits
32-35	File Sequence Number	4	Digits
36-39	Generation Number	4	Digits
40-41	Generation Version Number	2	Digits
42-47	Creation Date	6	SPACE, Digits
48-53	Expiration Date	6	SPACE, Digits
54	File Accessibility	1	a-character
55-60	Block Count	6	Digits
61-73	Implementation Identifier	13	a-characters
74-80	(Reserved for future standardization)	7	SPACEs

Within a Labeled-Sequence the contents of the fields of this label shall be identical with the contents of the corresponding fields in the First File Header Label, except for the following fields.

8.8.1.1 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be EOF.

8.8.1.2 Block Count (BP 55-60). This field shall specify, as a six-digit decimal number, the number of blocks in which the file section is recorded. The characters in this field shall be digits.

8.8.1.3 Implementation Identifier (BP 61-73). This field shall specify an identification of the implementation which recorded the label set. The characters in this field shall be a-characters.

8.8.2 Second End of File Label (EOF2)

BP	Field Name	L	Content
1-3	Label Identifier	3	EOF
4	Label Number	1	2
5	Record Format	1	F or D or S
6-10	Block Length	5	Digits
11-15	Record Length	5	Digits
16-50	(Reserved for implementation use)	35	Not specified
51-52	Offset Length	2	Digits
53-80	(Reserved for future standardization)	28	SPACEs

Within a Labeled-Sequence the contents of the fields of this label shall be identical with the contents of the corresponding fields in the Second File Header Label, except for the following fields.

8.8.2.1 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be EOF.

8.8.2.2 Field Reserved for Implementation Use (BP 16-50). This field shall be reserved for implementation use. This standard neither specifies nor restricts the bit combinations which may be recorded in this field, nor does it specify any meaning for these bit combinations.

8.8.3 Other End of File Labels (EOF3 to EOF9). Other End of File Labels are optional. If present, they shall contain implementation-defined information and shall have the following layout.

BP	Field Name	L	Content
1-3	Label Identifier	3	EOF
4	Label Number	1	Digits 3 to 9
5-80	(Reserved for implementation use)	76	Not specified

8.8.3.1 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be EOF.

8.8.3.2 Label Number (BP 4). This field shall specify the label number. The character in this field shall be one of the digits THREE to NINE.

8.8.3.3 Field Reserved for Implementation Use (BP 5-80). This field shall be reserved for implementation use. This standard neither specifies nor restricts the bit combinations which may be recorded in this field, nor does it specify any meaning for these bit combinations.

8.9 User File Trailer Label Set (UTL). A User File Trailer Label Set is optional. If present, its labels shall have the following layout.

BP	Field Name	L	Content
1-3	Label Identifier	3	UTL
4	Label Number	1	a-character
5-80	(Reserved for application use)	76	Not specified

8.9.1 Label Identifier (BP 1-3). This field shall specify the label identifier. The characters in this field shall be UTL.

8.9.2 Label Number (BP 4). This field shall be reserved for application use. The character in this field shall be an a-character.

8.9.3 Field Reserved for Application Use (BP 5-80). This field shall be reserved for application use. This standard neither specifies nor restricts the bit combinations which may be recorded in this field, nor does it specify any meaning for these bit combinations.

9. Levels of Interchange

This standard specifies four nested levels of interchange.

At all levels, labels specified as optional by this standard may be recorded. These labels may be ignored in interchange.

9.1 Level 1. At Level 1 the following restrictions shall apply:

- a volume set shall contain only one file, and
- all records in the file shall be fixed-length records.

9.2 Level 2. At Level 2 the following restriction shall apply:

- all records in any file shall be fixed-length records.

9.3 Level 3. At Level 3 the following restriction shall apply:

- all records in any file shall be either fixed-length records or variable-length records.

9.4 Level 4. At Level 4 no restrictions apply.

10. Requirement for the Description of Systems

Information shall be communicated between an application program and an implementation, or between an installation and an implementation (see Sections 11 and 12).

An information processing system that conforms to this standard shall be the subject of a description which identifies the means by which the user may supply such information, or may obtain it when it is made available, as specified in this standard.

11. Requirements for an Originating System

11.1 General. The implementation in an originating system shall be capable of recording a file set, and all labels that are not specified in this standard as being optional, on a volume set in accordance with one of the interchange levels specified in this standard.

The implementation shall not be required to record any labels that are specified in this standard as being optional.

11.2 Files. The implementation shall obtain from the application program:

- the records that constitute the files of the file set to be recorded
- the length of each record in the file

NOTE: An RCW or SCW does not form part of a record.

11.3 Labels

11.3.1 The implementation shall permit the installation to supply the information that is to be recorded in each of the label fields listed below, and shall supply the information for a field if the installation does not supply it.

For each volume in the volume set:

- Volume Identifier VOL1 BP 5-10
- Volume Accessibility VOL1 BP 11

For each file in the file set:

- File Accessibility HDR1 BP 54

11.3.2 If the implementation permits the installation to supply the information that is to be recorded in any of the label fields listed below, then the implementation shall record such information as supplied by the installation, and shall supply the information if the installation does not supply it.

For each volume in the volume set:

- Owner Identifier VOL1 BP 38-51

For each file in the file set:

- File Set Identifier HDR1 BP 22-27

11.3.3 The implementation shall permit the application program to supply the information that is to be recorded in each of the label fields listed below, and shall supply the information for a field if the application program does not supply it.

For each file in the file set:

- | | |
|-------------------|---------------|
| — File Identifier | HDR1 BP 5-21 |
| — Record Format | HDR2 BP 5 |
| — Block Length | HDR2 BP 6-10 |
| — Record Length | HDR2 BP 11-15 |

11.3.4 If the implementation permits the application program to supply the information that is to be recorded in any of the label fields listed below, then the implementation shall record such information as supplied by the application program, and shall supply the information if the application program does not supply it.

For each file in the file set:

- | | |
|-----------------------------|---------------|
| — Generation Number | HDR1 BP 36-39 |
| — Generation Version Number | HDR1 BP 40-41 |

For each file section in the file set:

- | | |
|-------------------|---------------|
| — Creation Date | HDR1 BP 42-47 |
| — Expiration Date | HDR1 BP 48-53 |

11.3.5 If the implementation is capable of recording an Installation Volume Label Set, then the implementation shall permit the installation to supply the information that is to be recorded in the label fields listed below for that label set, and shall not be required to record the corresponding label if the installation does not supply the information.

For each label in an Installation Volume Label Set recorded on any volume in the volume set:

- | | |
|---------------------------------|---------|
| — Reserved for Installation Use | BP 5-80 |
|---------------------------------|---------|

NOTE: If any label in an Installation Volume Label Set is not recorded, then 6.2.2 of this standard requires that no higher numbered labels in the set shall be recorded.

11.3.6 If the implementation is capable of recording a User Header or a User Trailer Label Set, then the implementation shall permit the application program to supply the information that is to be recorded in the label fields listed below for that label set, and shall not be required to record the corresponding label if the application program does not supply the information.

For each label in a User Header and a User Trailer Label Set that forms part of any Labeled-Sequence on a volume:

- | | |
|--------------------------------|---------|
| — Label Number | BP 4 |
| — Reserved for Application Use | BP 5-80 |

11.4 Restrictions. The implementation may apply restrictions on the information supplied by the user in the Record Length field (HDR2 BP 11-15) as follows:

- If the records in a file are segmented records, the implementation may impose a limit on the maximum record length. This limit shall not be less than the maximum assignable block length, less the length of the Offset field and the length of the SCW.
- If the records in a file are variable-length records, the implementation may assign a maximum record length equal to the assigned maximum block length, less the length of the Offset field and the length of the RCW.

12. Requirements for a Receiving System

12.1 General. The implementation in a receiving system shall be capable of reading a file set, and all recorded labels, from a volume set that has been recorded in accordance with one of the interchange levels specified in this standard.

The implementation may ignore the information from any labels that are specified in this standard as being optional.

12.2 Files. The implementation shall make available to the application program:

- the records that constitute the files of the recorded file set
- the length of each record in the file

NOTE: An RCW or SCW does not form part of a record.

12.3 Labels

12.3.1 The implementation shall permit the user to supply information sufficient to enable the implementation to locate the files required by the user, and to locate the volumes on which these files are recorded.

12.3.2 The implementation shall make available to the installation the information that is recorded in each of the label fields listed below.

For each volume in the volume set:

- Volume Identifier VOL1 BP 5-10
- Volume Accessibility VOL1 BP 11

For each file in the file set:

- File Accessibility HDR1 BP 54

12.3.3 The implementation shall make available to the application program the information that is recorded in each of the label fields listed below.

For each file in the file set:

- File Identifier HDR1 BP 5-21
- Record Format HDR2 BP 5
- Block Length HDR2 BP 6-10
- Record Length HDR2 BP 11-15

12.3.4 If the implementation is capable of making available to the user the information that is recorded in an Installation Volume Label Set, it shall make available to the installation the information that is recorded in each of the label fields listed below.

For each recorded label in an Installation Volume Label Set on any volume in the volume set:

- Reserved for Installation Use BP 5-80

12.3.5 If the implementation is capable of making available to the user the information that is recorded in a User Header or User Trailer Label Set, it shall make available to the application program the information that is recorded in each of the label fields listed below.

For each recorded label in a User Header and a User Trailer Label Set that forms part of any Labeled-Sequence on a volume:

- Label Number BP 4
- Reserved for Application Use BP 5-80

12.4 Restrictions. If the records in a file are segmented records, the implementation may impose a limit on the length of a record in the file. This limit shall not be less than the maximum assignable block length, less the length of the Offset field and the length of the SCW. The implementation is not required to make available to the application program any byte beyond the first n bytes of the record, where n is the value of the imposed limit.

Appendixes

(These Appendixes are not part of American National Standard X3.27-1987, but are included for information only.)

Appendix A Initialized Volumes

A1. Purpose

An installation which originates recorded magnetic tapes for information interchange will need to have available a supply of magnetic tape volumes which are ready to be recorded with interchange file sets. Such volumes will typically be unrecorded, or will contain only data that need not be retained. File sets can then be recorded on some of these volumes when the need for data interchange arises.

At an installation, the administration of these magnetic tape volumes can be simplified if appropriate volume identification details are already recorded in the first label group on each volume, although no valid file sections are recorded on the volumes. A volume recorded in this way is known as an initialized volume. If initialized volumes and data interchange volumes are handled by common administrative arrangements, it may be convenient if the specification of an initialized volume can be closely related to the specification of an interchange volume. For this purpose a recommended specification for an initialized volume is provided below. The specification makes use only of elements already specified in the body of this standard.

A2. Specification

The data on an initialized volume shall consist of the sequence of blocks and tape marks as listed below, recorded consecutively:

- Beginning of Volume Label Group
- two tape marks.

Any information that is recorded following the second tape mark of the sequence may be ignored.

Appendix B

Main Differences between ANSI X3.27-1978 and ANSI X3.27-1987

B1. The structure and text of the specifications have been completely revised to improve clarity and to be technically identical with Information processing — File structure and labelling of magnetic tapes for information interchange, ISO 1001-1986.

B2. The requirements for information processing systems and the requirements for sets of magnetic tape volumes for interchange have been placed in distinct sets of sections, each with corresponding definitions of conformance.

B3. Up to eight additional Volume Header Labels may optionally be recorded on a magnetic tape volume, identified by VOL2 to VOL9.

B4. HDR2, EOVS, and EOF2 labels are now required also at Level 1 and Level 2.

B5. The contents of a file may consist of the coded representations of any type of information for which a standard exists, and is no longer restricted to coded character sets conforming to ANSI X3.4-1986.

B6. The responsibility for the selection and interpretation of the contents of the Accessibility fields is now clearly assigned to the installation.

B7. Appendix A, for the format of initialized volumes not yet recorded with data for interchange, has been added.

X3.115-1984 Unformatted 80 Megabyte Trident Pack for Use at 370 tpi and 6000 bpi (General, Physical, and Magnetic Characteristics)
X3.116-1986 Recorded Magnetic Tape Cartridge, 4-Track, Serial 0.250 Inch (6.30 mm) 6400 bpi (252 bpmm), Inverted Modified Frequency Modulation Encoded
X3.117-1984 Printable/Image Areas for Text and Facsimile Communication Equipment
X3.118-1984 Financial Services – Personal Identification Number – PIN Pad
X3.119-1984 Contact Start/Stop Storage Disk, 158361 Flux Transitions per Track, 8.268 Inch (210 mm) Outer Diameter and 3.937 inch (100 mm) Inner Diameter
X3.120-1984 Contact Start/Stop Storage Disk
X3.121-1984 Two-Sided, Unformatted, 8-Inch (200-mm), 48-tpi, Double-Density, Flexible Disk Cartridge for 13 262 ftrp Two-Headed Application
X3.122-1986 Computer Graphics Metafile for the Storage and Transfer of Picture Description Information
X3.124-1985 Graphical Kernel System (GKS) Functional Description
X3.124.1-1985 Graphical Kernel System (GKS) FORTRAN Binding
X3.125-1985 Two-Sided, Double-Density, Unformatted 5.25-inch (130-mm), 48-tpi (1.9-tpmm), Flexible Disk Cartridge for 7962 bpr Use
X3.126-1986 One- or Two-Sided Double-Density 5.25-inch (130-mm), 96 Tracks per Inch
X3.127-1987 Unrecorded Magnetic Tape Interchange
X3.128-1986 Contact Start-Stop Storage Transitions per Track, 130-mm (5.118-in) 40-mm (1.575-in) Inner Diameter
X3.129-1986 Intelligent Peripheral Interchange
X3.130-1986 Intelligent Peripheral Interchange Specific Command Sets for Magnetic Disk
X3.131-1986 Small Computer Systems Interchange
X3.132-1987 Intelligent Peripheral Interchange Generic Command Set for Optical and Magnetic

X3.133-1986 Database Language –NDL
X3.135-1986 Database Language – SQL
X3.136-1986 Serial Recorded Magnetic Tape Cartridge for Information Interchange, Four and Nine Track
X3.139-1987 Fiber Distributed Data Interface (FDDI) Token Ring Media Access Control (MAC)
X3.140-1986 Open Systems Interconnection – Connection Oriented Transport Layer Protocol Specification
X3.141-1987 Data Communication Systems and Services – Measurement Methods for User-Oriented Performance Evaluation
X3.146-1987 Device Level Interface for Streaming Cartridge and Cassette Tape Drives
X3.147-1987 Intelligent Peripheral Interface – Logical Device Generic Command Set for Magnetic Tapes
X3.153-1987 Open Systems Interconnection – Basic Connection Oriented Session Protocol Specification
X3.156-1987 Nominal 8-Inch Rigid Disk Removable Cartridge
X3.157-1987 Recorded Magnetic Tape for Information Interchange, 3200 CPI
X3.158-1987 Serial Recorded Magnetic Tape Cassette for Information Interchange, 0.150 Inch (3.81 mm), 8000 bpi (315 bpmm), Group Code Recording.
X11.1-1977 Programming Language MUMPS
IEEE 416-1978 Abbreviated Test Language for All Systems (ATLAS)

QC100.ANSI X3.27-1987
File Structure and Labeling of
Magnetic Tapes for Information
Interchange

DATE DUE

QC100.ANSI X3.27-1987
File Structure and Labeling of
Magnetic Tapes for Information
Interchange

ATLAS Language
ATLAS Syntax
Programming Language PASCAL
Use of ATLAS
or a Data Descriptive File for
the Manual for the Ada Programming
Identification – Data Format for
Information Processing Systems

American National Standards for Information

- X3.1-1976** Synchronous Signaling Rates for Data Transmission
- X3.2-1970** Print Specifications for Magnetic Ink Character Recognition
- X3.4-1986** Coded Character Sets — 7-Bit ASCII
- X3.5-1970** Flowchart Symbols and Their Usage
- X3.6-1965** Perforated Tape Code
- X3.9-1978** Programming Language FORTRAN
- X3.11-1969** General Purpose Paper Cards
- X3.14-1983** Recorded Magnetic Tape (200 CPI, NRZI)
- X3.15-1976** Bit Sequencing of the American National Standard Code for Information Interchange in Serial-by-Bit Data Transmission
- X3.16-1976** Character Structure and Character Parity Sense for Serial-by-Bit Data Communication in the American National Standard Code for Information Interchange
- X3.17-1981** Character Set for Optical Character Recognition (OCR-A)
- X3.18-1974** One-Inch Perforated Paper Tape
- X3.19-1974** Eleven-Sixteenths-Inch Perforated Paper Tape
- X3.20-1967** Take-Up Reels for One-Inch Perforated Tape
- X3.21-1967** Rectangular Holes in Twelve-Row Punched Cards
- X3.22-1983** Recorded Magnetic Tape (800 CPI, NRZI)
- X3.23-1985** Programming Language COBOL
- X3.25-1976** Character Structure and Character Parity Sense for Parallel-by-Bit Data Communication in the American National Standard Code for Information Interchange
- X3.26-1980** Hollerith Punched Card Code
- X3.27-1987** Magnetic Tape Labels and File Structure
- X3.28-1976** Procedures for the Use of the Communication Control Characters of American National Standard Code for Information Interchange in Specified Data Communication Links
- X3.29-1971** Specifications for Properties of Unpunched Oiled Paper Perforator Tape
- X3.30-1986** Representation for Calendar Date and Ordinal Date
- X3.31-1973** Structure for the Identification of the Counties of the United States
- X3.32-1973** Graphic Representation of the Control Characters of American National Standard Code for Information Interchange
- X3.34-1972** Interchange Rolls of Perforated Tape
- X3.37-1987** Programming Language APT
- X3.38-1972** Identification of States of the United States (Including the District of Columbia)
- X3.39-1986** Recorded Magnetic Tape (1600 CPI, PE)
- X3.40-1983** Unrecorded Magnetic Tape (9-Track 800 CPI, NRZI; 1600 CPI, PE; and 6250 CPI, GCR)
- X3.41-1974** Code Extension Techniques for Use with the 7-Bit Coded Character Set of American National Standard Code for Information Interchange
- X3.42-1975** Representation of Numeric Values in Character Strings
- X3.43-1986** Representations of Local Time of Day
- X3.44-1974** Determination of the Performance of Data Communication Systems
- X3.45-1982** Character Set for Handprinting
- X3.46-1974** Unrecorded Magnetic Six-Disk Pack (General, Physical, and Magnetic Characteristics)
- X3.47-1977** Structure for the Identification of Named Populated Places and Related Entities of the States of the United States for Information Interchange
- X3.48-1986** Magnetic Tape Cassettes (3.81-mm [0.150-Inch] Tape at 32 bps [800 bpi], PE)
- X3.49-1975** Character Set for Optical Character Recognition (OCR-B)
- X3.50-1986** Representations for U.S. Customary, SI, and Other Units to Be Used in Systems with Limited Character Sets
- X3.51-1986** Representations of Universal Time, Local Time Differentials, and United States Time Zone References
- X3.52-1976** Unrecorded Single-Disk Cartridge (Front Loading, 2200 BPI) (General, Physical, and Magnetic Requirements)
- X3.53-1976** Programming Language PL/I
- X3.54-1986** Recorded Magnetic Tape (6250 CPI, Group Coded Recording)
- X3.55-1982** Unrecorded Magnetic Tape Cartridge, 0.250 Inch (6.30 mm), 1600 bpi (63 bps), Phase encoded
- X3.56-1986** Recorded Magnetic Tape Cartridge, 4 Track, 0.250 Inch (6.30 mm), 1600 bpi (63 bps), Phase Encoded
- X3.57-1977** Structure for Formatting Message Headings Using the American National Standard Code for Information Interchange for Data Communication Systems Control
- X3.58-1977** Unrecorded Eleven-Disk Pack (General, Physical, and Magnetic Requirements)
- X3.60-1978** Programming Language Minimal BASIC
- X3.61-1986** Representation of Geographic Point Locations
- X3.62-1987** Paper Used in Optical Character Recognition (OCR) Systems
- X3.63-1981** Unrecorded Twelve-Disk Pack (100 Megabytes) (General, Physical, and Magnetic Requirements)
- X3.64-1979** Additional Controls for Use with American National Standard Code for Information Interchange
- X3.66-1979** Advanced Data Communication Control Procedures (ADCCP)
- X3.72-1981** Parallel Recorded Magnetic Tape Cartridge, 4 Track, 0.250 Inch (6.30 mm), 1600 bpi (63 bps), Phase Encoded
- X3.73-1980** Single-Sided Unformatted Flexible Disk Cartridge (for 6631-BPR Use)
- X3.74-1981** Programming Language PL/I, General-Purpose Subset
- X3.76-1981** Unformatted Single-Disk Cartridge (Top Loading, 200 tpi 4400 bpi) (General, Physical, and Magnetic Requirements)
- X3.77-1980** Representation of Pocket Select Characters
- X3.78-1981** Representation of Vertical Carriage Positioning Characters in Information Interchange
- X3.79-1981** Determination of Performance of Data Communications Systems That Use Bit-Oriented Communication Procedures
- X3.80-1981** Interfaces between Flexible Disk Cartridge Drives and Their Host Controllers
- X3.82-1980** One-Sided Single-Density Unformatted 5.25-Inch Flexible Disk Cartridge (for 3979-BPR Use)
- X3.83-1980** ANSI Sponsorship Procedures for ISO Registration According to ISO 2375
- X3.84-1981** Unformatted Twelve-Disk Pack (200 Megabytes) (General, Physical, and Magnetic Requirements)
- X3.85-1981** 1/2-Inch Magnetic Tape Interchange Using a Self Loading Cartridge
- X3.86-1980** Optical Character Recognition (OCR) Inks
- X3.88-1981** Computer Program Abstracts
- X3.89-1981** Unrecorded Single-Disk, Double-Density Cartridge (Front Loading, 2200 bpi, 200 tpi) (General, Physical, and Magnetic Requirements)
- X3.91M-1987** Storage Module Interfaces
- X3.92-1981** Data Encryption Algorithm
- X3.93M-1981** OCR Character Positioning
- X3.94-1985** Programming Language PANCM
- X3.95-1982** Microprocessors — Hexadecimal Input/Output, Using 5-Bit and 7-Bit Teleprinters
- X3.96-1983** Continuous Business Forms (Single-Part)
- X3.98-1983** Text Information Interchange in Page Image Format (PIF)
- X3.99-1983** Print Quality Guideline for Optical Character Recognition (OCR)
- X3.100-1983** Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment for Packet Mode Operation with Packet Switched Data Communications Network
- X3.101-1984** Interfaces Between Rigid Disk Drive(s) and Host(s)
- X3.102-1983** Data Communication Systems and Services — User-Oriented Performance Parameters
- X3.103-1983** Unrecorded Magnetic Tape Minicassette for Information Interchange, Coplanar 3.81 mm (0.150 in)
- X3.104-1983** Recorded Magnetic Tape Minicassette for Information Interchange, Coplanar 3.81 mm (0.150 in), Phase Encoded
- X3.105-1983** Data Link Encryption
- X3.106-1983** Modes of Operation for the Data Encryption Algorithm
- X3.110-1983** Videotex/Teletext Presentation Level Protocol Syntax
- X3.111-1986** Optical Character Recognition (OCR) Matrix Character Sets for OCR-M
- X3.112-1984** 14-in (356-mm) Diameter Low-Surface-Friction Magnetic Storage Disk
- X3.113-1987** Programming Language FULL BASIC
- X3.114-1984** Alphanumeric Machines; Coded Character Sets for Keyboard Arrangements in ANSI X4.23-1982 and X4.22-1983

(Continued on reverse)